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### APPARENT NEOTENY IN THE SAW-WHET OWLS OF MEXICO AND CENTRAL AMERICA

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At present two species of saw-whet owls are recognized, namely: the spotted saw-whet owl, *Aegolius acadicus*, and the unspotted saw-whet owl, *Aegolius ridgwayi*.

*Aegolius acadicus* has immature and adult plumages, in both of which the wings and tail are profusely spotted. *A. a. acadicus* (Gmelin) breeds from southern Alaska east to Nova Scotia and south through the mountains of southwestern United States and Mexico to Querétaro and Veracruz (Friedmann, Griscom, and Moore, 1950, p. 150). *A. a. brooksi* (Fleming) is resident on the Queen Charlotte Islands.

*Aegolius ridgwayi* lacks spotting on the wings and tail. Its three subspecies, each known from a single specimen, are *ridgwayi* of Costa Rica, *rostratus* of Guatemala, and *tacanensis* of extreme southern Chiapas. Rather remarkably, these forms have never been found in the typical adult plumage, and Griscom (1930, p. 2) suggests that they may never acquire it. The question immediately comes to mind whether the spotted and unspotted forms may be geographic representatives of the same species. Peters (1940, p. 174) says: "*A. rostrata* and *A. ridgwayi* are certainly conspecific, in fact it is quite probable that they are conspecific with *acadicus*. Until it is definitely known that they have an adult plumage similar to that of *acadicus* I prefer to maintain them as a specific entity."

As one comes progressively southward the extent of spotting gradually diminishes and vanishes. Secondly, for some unknown physiological reason, the southern forms apparently never acquire a typical adult plumage. Are we justified, however, in considering forms known only from immature stages to be specifically distinct from those which have an adult plumage as well?

We may profitably study the case of the several larval salamanders or axolotls of the family Ambystomidae found in the mountain lakes of Mexico and elsewhere. These forms usually retain their gills through life and breed in the larval state. Smith and Taylor (1948, p. 6) in a key to the Mexican Ambystomidae list two genera which are neotenic in nature, both from the southern part of the plateau of Mexico. They are *Bathysiredon*, presumably incapable of transformation, and *Siredon*, capable of artificial transformation, or in the case of one of its species, at least occasional natural transformation may occur.

A great deal of experimental study relating to the role of the thyroid gland in metamorphosis has been made on the American axolotl, *Ambys-*

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*toma tigrinum*. An excellent discussion is given by Lynn and Wachowski (1951, p. 123-168). They say the "failure to metamorphose in nature has been variously ascribed to deficiency in the animal's thyroid secretion, exceptional tissue insensitivity to the thyroid influence, or impairment of the thyrotrophic function of the pituitary." The latter hypothesis is favored at present. Whatever the cause may be, the fact remains that cold-blooded vertebrates may be artificially induced to metamorphose through the administration of thyroid extract, iodine, or iodine compounds. The failure of amphibians to reach adult status is due then to either direct or indirect malfunction of the thyroid.

At no time have modern herpetologists taxonomically separated a form unless it had structural differences also. Refer, for example, to E. R. Dunn's paper (1940) on the races of *Ambystoma tigrinum*. For each race a diagnosis is given based on external coloration and pattern, structure, and method of egg laying. Prevalence of neoteny is also given for each subspecies, but it is not diagnostic in itself.

Benoit (1950, p. 296) summarizes the effect of thyroid extract administration in birds, and says that during the moult the thyroid is very active. An artificial moult may be induced by injections of thyroxin. Furthermore, the thyroid exercises an influence on the shape and pigmentation of the feathers. Conversely, thyroidectomy brings about a halting or strong retardation of the growth of the feathers along with the augmentation of melanin and the diminution of red pigments.

It seems not at all impossible that these owls may also exhibit neotenic types. The persistence of immature characters into adulthood is probably a not too rare evolutionary phenomenon and is not necessarily a criterion of primitiveness. With the above in mind, I consider all forms of *Aegolius acadicus* as conspecific.

In a collection of skins from Oaxaca, which I am presently studying, a saw-whet owl in immature plumage proves to be an extremely interesting specimen. This bird in wing and tail markings is exactly intermediate between the spotted birds to the north and the unspotted ones to the south. Its characters further bridge the gap between the northern and southern population, hitherto considered specifically distinct.

The history of our knowledge of this group is interesting. In 1905, Alfaro discovered the very distinct *ridgwayi* in Costa Rica. From farther north, in Guatemala, Griscom (1930) described *rostratus*, a form whose characters help connect *ridgwayi* to *acadicus*. Then in 1947, Moore described *tacanensis* from the Mexican-Guatemala boundary with characters further uniting the tropical forms to the northern *acadicus*. The specimen from Oaxaca completes the chain linking the tropical races with the north temperate *acadicus*. I describe it as

#### *Aegolius acadicus brodkorbi*, new subspecies

Type.—University of Florida, no. 1854; male; Amatepec, Oaxaca, Mexico; May 12, 1949; Mario del Toro Avilés, collector.

Superciliary region, forehead, and anterior suborbital area to chin white. Posterior suborbital region and auricular ruff grading rather abruptly from inconspicuous white at base of feathers to Bister (color names in capitals are from Ridgway, 1912). Marginal area around eye and lores black. Pileum and entire upperparts uniform Prout's Brown

to Bister with slight chestnut tint similar to coloring of auricular region. Buff feathers similar in coloring with a few buffy spots. Wings Clove Brown. Outer web of first, third, fourth, and fifth primaries with two to four small buffy white spots, the sixth having one small spot. Second primary lacks spots and is sinuate on outer web. All primaries narrowly edged with pale buffy. Outer web of secondaries without spots. Inner webs of secondaries and all primaries except outer three with three or four buffy spots. Alula narrowly edged with white. Under wing coverts Cream-Buff (similar to belly) and mottled with brown. Rectrices Clove Brown, with small whitish spots in three consecutive rows, and tipped with extremely narrow band of white, enlarging progressively from outer to middle rectrices to form a white spot at tip of distal end of inner web. Lower throat with band of Prout's Brown mixed with Cinnamon. Chest Saccardo's Umber grading posteriorly to Cream-Buff. Belly, flanks, and legs Cream-Buff, becoming Cartridge Buff on crissum. Feathering of hind toe and outer toe Cartridge Buff, extending practically to claw. Middle toe bare 4.5 mm. from claw. Inner toe with last 6 mm. bare, feathered for 11 mm. No pin feathers seen. Bill blackish, with culmen slightly lighter, and gonys and tip of maxilla yellowish. Iris yellow. Skin of toes yellowish. Claws brown, paler at base (dried skin).

Wing 142, tail 72.5, culmen from cere 12.5, depth of bill at cere 10, tarsus 24.5, middle toe 18.5, claw of middle toe (from skin) 10.5 mm.

Characters.—Differs from juvenile plumage of *Aegolius acadicus acadicus* (Gmelin) in having a greater extent of white on face (superciliary region, forehead, anterior suborbital area, and chin); upperparts with no trace of the whitish or buffy spotting especially prominent in the scapular region of *acadicus*; under wing coverts darker like *brooksi*; outer web of primaries with less white; inner web of outer three primaries plain; the remaining ones with inconspicuous buffy spotting, in contradistinction to *acadicus* in which the whitish spots are larger and more confluent proximally, and are present at least to some extent on all the primaries; upper wing coverts completely without spotting; alula with white border narrower; whitish spotting of tail more restricted than average of *acadicus*. The type is larger than males of *acadicus*, agreeing in size with the females. However, some mistakes in sexing occur in other species in this collection.

Differs from *Aegolius acadicus tacanensis* Moore in having wings and tail spotted.

Differs from *Aegolius acadicus rostratus* (Griscom) in having wings and tail spotted and in having a smaller culmen.

Differs from *Aegolius acadicus ridgwayi* (Alfaro) in having wing and tail spotted; face white; toes feathered except part of most distal phalanx.

Although the present specimen is in immature plumage, I do not wish to leave the impression that this species may not have a mature plumage in Oaxaca. The only published Oaxacan record is a male listed by Selater (1858) from Cinco Senores. I have not been able to find this specimen, and it may well be in adult plumage. Macdonald (in litt., 1952) says it is not in the British Museum.

Range.—Known only from the type locality. Amatepec is located in the region of Mixe, which is in the same cordillera forming the Nudo

de Zempoaltepec. It is in the tierra fria at an altitude of 2,100 meters or 6,825 feet.

Specimens examined.—*A. a. acadicus*: 16 immatures (United States and Canada), two subadults (Michoacán and United States), five adults (Mexico, United States, and Canada). *A. a. brooksi*: one immature (Graham Island).

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